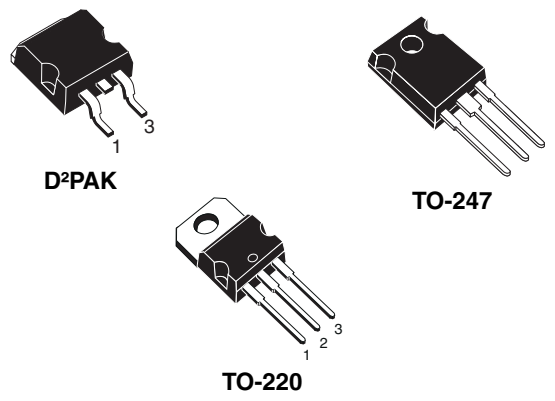
STB75NF20
STP75NF20 - STW75NF20

N-channel 200V - 0.028Ω - 75A - D²PAK - TO-220 - TO-247
Low gate charge STripFET™ Power MOSFET

General features

Type	V_{DSS}	$R_{DS(on)}$	I_D
STB75NF20	200V	<0.034Ω	75A
STP75NF20	200V	<0.034Ω	75A
STW75NF20	200V	<0.034Ω	75A

- Exceptional dv/dt capability
- Low gate charge
- 100% Avalanche tested



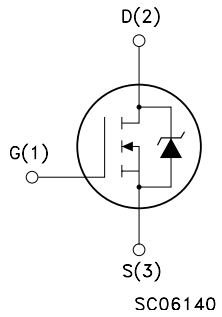
Description

This Power MOSFET series realized with STMicroelectronics unique STripFET™ process has specifically been designed to minimize input capacitance and gate charge. It is therefore suitable as primary switch in advanced high-efficiency isolated DC-DC converters

Applications

- Switching application

Internal schematic diagram



Order codes

Part number	Marking	Package	Packaging
STB75NF20	75NF20	D²PAK	Tape & reel
STP75NF20	75NF20	TO-220	Tube
STW75NF20	75NF20	TO-247	Tube

1 Electrical ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage (V_{GS} = 0)	200	V
V_{GS}	Gate-source voltage	± 20	V
I_D	Drain current (continuous) at T_C = 25°C	75	A
I_D	Drain current (continuous) at T_C = 100°C	47	A
I_{DM}(1)	Drain current (pulsed)	300	A
	Derating factor	1.52	W/°C
dv/dt	Peak diode recovery voltage slope	15	V/ns
P_{TOT}	Total dissipation at T_C = 25°C	190	W
T_J Tstg	Operating junction temperature Storage temperture	-50 to 150	°C

1. $I_{SD} \leq$ 75A, di/dt $\leq$ 400A/µs, $V_{DD} \leq$ 160

Table 2. Thermal resistance

Symbol	Parameter	Value		Unit
		TO-220/D²PAK	TO-247	
R_{thJC}	Thermal resistance junction-case max	0.66		°C/W
$R_{thJ\text{-}pcb}$ (1)	Thermal resistance junction-pcb max	34	--	°C/W
R_{thJA}	Thermal resistance junction-ambient max	62.5	40	°C/W
T_l	Maximum lead temperature for soldering purpose	300		°C

1. When mounted on inch²FR-4 board (t $\leq$ 10µs)

Table 3. Avalanche characteristics

Symbol	Parameter	Max value	Unit
I_{AR}	Avalanche current, repetitive or not-repetitive (pulse width limited by T_J max)	37	A
E_{AS}	Single pulse avalanche energy (starting T_J= 25°C, Id= Iar, Vdd=50V)	205	mJ

2 Electrical characteristics

(T_{CASE}=25°C unless otherwise specified)

Table 4. On/off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	I_D = 1mA, V_{GS}= 0	200			V
I_{DSS}	Zero gate voltage drain current (V_{GS} = 0)	V_{DS} = Max rating, V_{DS} = Max rating @125°C			1 10	µA µA
I_{GSS}	Gate body leakage current (V_{DS} = 0)	V_{DS} = ± 20V			±100	nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS}= V_{GS}, I_D = 250µA	2	3	4	V
$R_{DS(on)}$	Static drain-source on resistance	V_{GS}= 10V, I_D= 37A		0.028	0.034	Ω

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
g_{fs}(1)	Forward transconductance	V_{DS} = 15V, I_D= 37A		40		S
C_{iss} C_{oss} C_{rss}	Input capacitance Output capacitance Reverse Transfer Capacitance	V_{DS} = 25V, f = 1 MHz, V_{GS} =0		3260 640 110		pF pF pF
Q_g Q_{gs} Q_{gd}	Total gate charge Gate-source charge Gate-drain charge	V_{DD}= 160V, I_D=75A, V_{GS}= 10V		84 18 34		nC nC nC

1. Pulsed: pulse duration = 300µs, duty cycle 1.5%

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r $t_{d(off)}$ t_f	Turn-on delay time Rise time Turn-off delay time Fall time	V_{DD} = 100V, I_D = 37A R_G= 4.7Ω, V_{GS}= 10V,		53 33 75 29		ns ns ns ns

Table 7. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD} I_{SDM}(1)	Source-drain current Source-drain current (pulsed)				75 300	A A
V_{SD}(2)	Forward on voltage	I_{SD} = 75A, V_{GS} = 0			1.6	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	I_{SD} = 75A,V_{DD} = 100V di/dt = 100 A/µs T_j = 25°C		222 2.18 19		ns µC A
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	I_{SD} = 75A, V_{DD} = 100V di/dt = 100 A/µs T_j = 150°C		267 3 22		ns µC A

1. Pulse with limited by maximum temperature
2. Pulsed: pulse duration = 300µs, duty cycle 1.5%

2.1 Electrical characteristics (curves)

Figure 1. Safe operating area for TO-220 / D²PAK

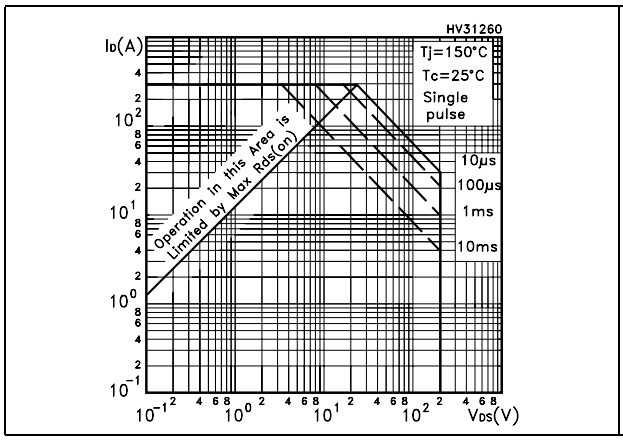


Figure 2. Thermal impedance for TO-220 / D²PAK

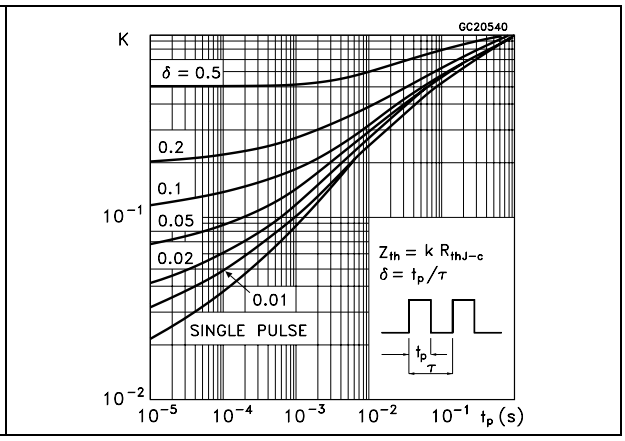


Figure 3. Safe operating area for TO-247

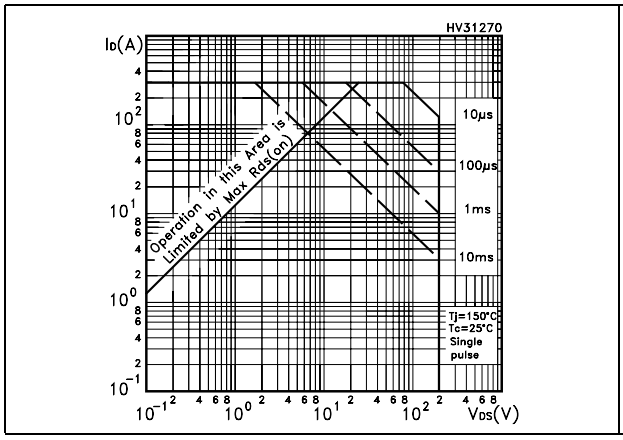


Figure 4. Thermal impedance for TO-247

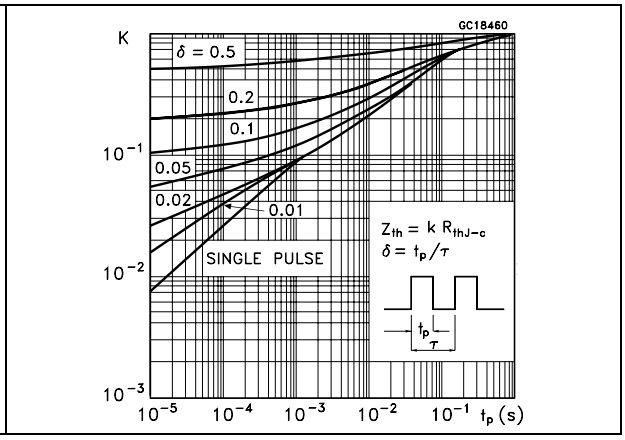


Figure 5. Output characterisics

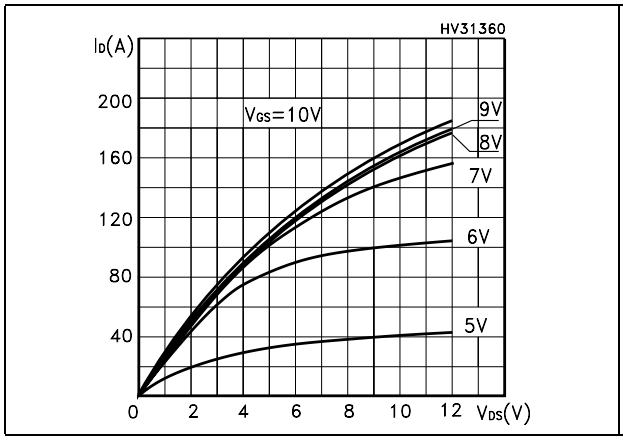


Figure 6. Transfer characteristics